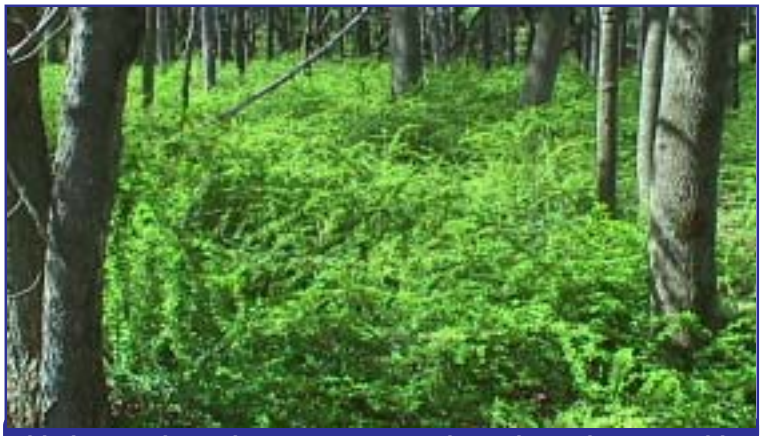
DOWNSTREAM
A Newsletter Provided by
MDC Division of Watershed Management
Number 8 Spring 2003

Invasive Plants: The Protection of Native Diversity on Massachusetts Woodlots

by Thom Kyker-Snowman



This image shows how Japanese Barberry has taken over this woodland understory. The dense mass not only limits biodiversity now, but also threatens future forest growth through the elimination of opportunities for young saplings to propagate.

It could be seen as the most aggressive North American invasion since 1775, but modern Paul Reveres have barely managed to get the public's attention. And yet, to those who have learned to spot them, the invading troops are every bit as obvious as a line of British Redcoats. In fact, these invasions have been going on since the first ships brought both human and plant colonists to North America. Queen Anne's lace is easy to suspect, but who would believe that buttercup and daisies are not native Americans? New England is a region dense with ports, which helps explain why thirty percent of the region's flora is exotic.

What are "Invasive Plants?"

Non-native plants have been established in gardens throughout North America, and as many as 4,000 non-native species currently reside here (at least 900 are present in Massachusetts). Most of these never move out of the garden, because they are unable to compete, reproduce, and/or survive away from intensive horticultural support. However, an alarming number of species do extremely well in the wild, in particular because they often have arrived in this "foreign land" without bringing along the pests that eat them. But their ability to survive in the wild does not categorically qualify these foreigners as "invasive." To earn this label, they must be able to compete aggressively and to the exclusion of native species. The worst of the invaders are displacing entire associations of native species and replacing them with alien monocultures.

So, you might still ask, what's the big deal? Does it really matter which plants occupy natural spaces, so long as these areas are vegetated? Some of these invaders are actually more verdant or have more attractive flowers than their native counterparts. The real issue is one of avoiding accelerated change in an ecological system that has taken thousands upon thousands of years to evolve. While population biology tells us that the system would eventually evolve back toward diversity – by developing species that thrive by eating or competing with these invasives – there may be irretrievable species loss in the interim. For example, the diminutive bird's foot violet is easily overwhelmed by exotics, yet it provides the exclusive food for the caterpillar of the regal fritillary butterfly. The problem is acute when an already endangered species is displaced. Evidence has suggested that the West Virginia White butterfly – diminishing throughout its range – is another victim of an invasive. While this insect has long utilized native mustards, larvae that emerge from eggs laid on the invasive garlic mustard (*Alliaria petiolata)* fail to develop. The Nature Conservancy reported in 1996 that 42% of the declines of threatened and endangered species in the U.S. are partly due to the effects of invasive species. Some invasives, such as the non-native white mulberry (*Morus albai*) are gradually invading native *genetics* as well, by hybridizing with their native counterparts.

Purple loosestrife (*Lythrum salicaria L.*) has become the "poster child" of the movement toward awareness of invasives. It was introduced as a beautiful wetland landscape plant, arriving during the 1800s from Europe. Beekeepers love the plant for its nectar-producing ability. Among the reasons for its success is the plant's ability to produce 300,000 or more seeds from a single stalk, and if this weren't sufficiently prolific, the plant reproduces vegetatively as well from rapidly expanding rhizomes. The plant has expanded to cover an estimated 500,000 acres in northern U.S. and southern Canada, and is now present in 90% of the wetlands used by breeding waterfowl along the Atlantic and Mississippi flyways – small wonder that it is hated by America's duck hunters. Its density in some shallow wetlands has rendered them inhospitable not just for ducks, but also muskrats, turtles, and even spawning northern Pike. While it has been declared a noxious weed in many states and is outright illegal to plant in Minnesota, some nurseries still sell it for perennial gardens.

Purple loosestrife is only one of the more noxious invaders (recently replacing kudzu in the popular press). But its story of expansion typifies many of the exotic arrivals:

- Tremendous ability to reproduce and displace native species in its favored habitat. In addition to elevated seed production and dispersal, evidence

now suggests invasives have smaller amounts of DNA – and can thus divide and multiply more quickly – than non-invasives.

- No effective natural predators or specific diseases present in the invaded territory.
- Economic incentives for their initial dispersal (such as landscaping or wildlife plantings).
- Lag time in knowledge of the damage inflicted by dispersal. Nurseries, landscape designers, and extension services continue to promote their use long after they have become invasive in natural settings.

Specific problems in Massachusetts' woodlands

Perhaps the most obvious problem with invasives in woodlands is their ability to prevent the regeneration of trees following natural or human disturbances. At Quabbin Reservoir, the combination of protracted overbrowsing by deer and the presence of planted exotics surrounding many of the old homesites has led to impenetrable thickets of Japanese barberry (*Berberis thunbergii*). These thickets have successfully monopolized the understory in some areas, especially on historically arable land that is now under red pine plantations. While barberry is the only shrub in some overbrowsed areas and may be providing important support for wildlife, it also threatens the stability of the forest cover by preventing regeneration.

Phragmites, while decorative in wet gardens has supplanted many other wetland plants. It does not, however, provide the same cover and food resources for wildlife as the plants they have displaced.

Oriental bittersweet (*Celastrus orbiculatus Thunberg*) is another local forest invader. It can choke young saplings or simply overwhelm regenerating areas before tree seedlings have a chance to take hold. Woodland clearings may promote the rapid growth of bittersweet when it is present. Norway maple (*Acer platanoides*) has replaced native trees, including sugar maple in floodplains and wet soils. Winged euonymus (*Euonymus alatus)* moves from houselots into adjacent forests and can prevent regeneration. Autumn olive (*Eleagnus umbellata*), still recommended for its wildlife value, spreads easily with the help of the birds it is planted to support, and can displace native populations. Common and shining buckthorn (*Rhamnus cathartica* and *frangula*) are shrubs moving from clearings into older, more open woodlands. Japanese honeysuckle (*Lonerica japonica Thunberg*), another escaped horticultural planting, can prevent regeneration and smother native wildflowers when it invades woodlands.

What should a landowner do?

Like so many problems, prevention is the best solution. Begin by identifying both the native (especially rare) and the exotic flora in your woodland. Your consulting forester and/or a consulting botanist can help. (The Massachusetts Forest Stewardship Program is considering the addition of an incentive practice that would share the cost of this inventory work – call them at 413-256-1201 for details.) The easiest plant populations to control are those that have barely started. Early detection requires vigilance – but makes for another good excuse to spend the day wandering your woods! If you don't have time to learn them all, start with the Top Ten Invasives list on page 4 of this newsletter. This list is taken from an evaluation effort conducted by the Massachusetts Invasive Plant Working Group. For more details, check under "Invasive Plants" on www.mnla.com, the web site of the Mass Nursery and Landscape Association, Inc.

Once you have identified invasives, control methods available to landowners are generally either mechanical or chemical (biological controls are under development for some species). Full mechanical control (i.e., pull them out) is a reasonable approach for small populations. Be sure to get the whole plant, and hang it somewhere that will dry the roots before they can sneak back into the ground. A tool called a "weed wrench" has proven very effective for larger plants. You can view a weed wrench, as well as other useful weed control tools at http://tncweeds.ucdavis.edu/tools.html. A problem with pulling is that it opens the soil to further invasion – heavy mulching of the area with thick layers of straw or leaves may prevent the germination of soil-banked seed. For small populations of larger shrubs or trees, simply girdling the stem by removing a 2-inch wide strip of bark and cambium all the way around may work.

If you can't take care of the plant immediately, flag it so you can return with the proper tools. Repeated cutting may eventually stop the spread of a local population, but you can't quit until all sprouting has ceased. Timing these cuttings when the plant's resources are concentrated above ground may help prevent recovery. Controlled burning deters some species, but unfortunately many invasives are simply stimulated by fire. Scarified and open areas invite invasions, so minimizing these will help prevent the spread of invasives. It may help to immediately seed all log landings and skid trails to a mix of native grasses and forbs. "Conservation mixes" often contain non-natives, so contact your forester or extension service for sources of native grass/forb mixes. For additional advice on native alternatives, visit the web site of the Massachusetts Native Plants Committee, www.massnativeplants.org or take a look at

The sequence above shows a weed wrench in action. First the tool is footed under the root mass of an unwanted plant. Then the plant, with it's root mass attached, is levered out of the ground.

"Native Alternatives for Invasive Ornamental Plant Species" by Timothy Abbey, available online on www.mnla.com.

With early detection and aggressive mechanical control, use of chemical controls should not be necessary for many invasives. However, for established populations and especially those with deep and abundant rhizomes that are not killed by cutting or mowing, extremely careful application of non-persistent herbicides may be the only effective means of control. Safe use of these chemicals requires a thorough knowledge of the potential to damage non-targeted species, and use of some restricted chemicals requires an applicators license.

A number of organizations are beginning to develop recommendations for mechanical, biological, and chemical controls. The "Wisconsin Manual of Control Recommendations for Ecologically Invasive Plants" is one such reference, available from the Bureau of Endangered Resources of the Wisconsin Department of Natural Resources. The Connecticut chapter of the Nature Conservancy (55 High Street, Middletown, CT 06457) has produced an excellent set of "Invasive Plant Information Sheets," which include thorough descriptions of the plant and the history and impact of its invasion, as well as clear control recommendations. For instance, the recommendation for control of glossy buckthorn says: "Control methods include cutting/mowing, girdling, excavation, and chemical control. Seedlings or small plants may be pulled by hand or removed with a grubbing hoe. Excavation is useful in areas with low density invasions. Repeated cutting, which reduces plant strength, is recommended twice in each season for two or three successive years. Girdling may be done all winter, does not disrupt the soil, and does not affect sensitive wetlands."

Jim McDougall, Land Manager for the Essex County Greenbelt Association, told an interesting story of an anonymous defender of native plants at a Massachusetts Forest Stewardship workshop on rare and invasive plants in managed forests. This woodland owner has been persistent in his commitment to native plants. He carries a holstered cordless drill and an oil can with a properly diluted herbicide on his daily walk through his woodland. Offending plants received a timely, precise injection and this steward has made good on his promise to keep his entire property free of non-native plants, primarily by paying attention.

Thom Kyker-Snowman is a Natural Resource Specialist in Forestry for the Metropolitan District Commission – Division of Watershed Management. He serves on the Massachusetts Native Plants Advisory Committee, and the Invasive Plants Working Group.

Further Reading

for more about Invasive Plant Species...

Invasive Plants: Weeds of the Global Garden, the Brooklyn Botanic Garden (BBG), 1000 Washington Avenue, Brooklyn, NY 11225-1099. 112 pp. $9.95. The BBG also has an excellent web site that includes information on invasives and native plants at www.bbg.org.

Invasive Plants Atlas of New England (IPANE), project on the New England Wildflower Society web site, www.newfs.org/ipane.htm

Visit the MDC/DWM online at:
www.state.ma.us/mdc/water.htm

And Another Thing...

by J. Taylor

"There are no bugs in this tree either. It must be another one of those invasive species."

Downstream is produced twice yearly by the Metropolitan District Commission/Division of Watershed Management of The Commonwealth of Massachusetts, and includes articles of interest to residents of the watershed system communities. Our goal is to inform the public about Watershed Protection issues and activities, provide a conduit for public input, and promote environmentally responsible land management practices.

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Top Ten Invasive Plants -Source, Massachusetts Native Plants Advisory Committee

Oriental bittersweet (Celastrus orbiculatus). A perennial upland vine, with berries spread by humans or birds. It overwhelms and eventually chokes the vegetation on which it grows.

Purple loosetrife (Lythrum salicaria). A perennial herb that overtakes and monopolizes wetlands. It has attractive purple flowers, and spreads by producing up to 2 million seeds per plant annually.

Autumn olive (Elaeagnus umbellate). An agressive perennial shrub spread by fruit eating birds. It outcompetes natives while changing the soil chemistry to favor its own dominance.

Morrow's/Japanese honeysuckle (Lonicera morrowii/japonica). A perennial shrub (Morrow's) or vine (Japanese) spread by birds. It grows rapidly and forms dense stands choking out competitors.

Multiflora rose (Rosa multiflora). As a shrub or a vine, this invasive perennial rose forms dense, thorny thickets that overwhelm vegetation in uplands, wetlands, and coastal areas.

Garlic mustard (Alliaria petiolata). This biennial herb occupies shady wooded uplands, spreads aggressively by seed and displaces insect supporting mustards, but does not support these same insects.

Common buckthorn (Rhamnus cathartica). A shrub to small tree (to 25'). This bird dispersed Eurasian perennial prefers uplands in full sun and forms dense thickets.

Common reed (Phragmites australis). This perennial graminoid (grass) overtakes native wetland plants, including cattails, to form huge, dense stands, especially in disturbed areas.

Japanese barberry (Berberis thunbergii). A perennial shrub with red fruit spread from plantings designed to support wildlife. It forms impenetrable, thorny thickets displacing native vegetation.

Japanese knotweed (Polygonum cuspidatum). This perennial, (often called Japanese bamboo), spreads vegetatively via rhizomes (root-like structures) forming dense, monopolizing stands.

We value the contribution your well cared for land provides and welcome the opportunity to work with you. Please feel free to send us questions and comments about this newsletter, or contact us if you wish to learn more about programs and assistance available to help landowners. Our address is shown below.

DOWNSTREAM

INSIDE

Invasive Plants

The following topics are discussed:

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